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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/604,654   | 08/07/2003  | Neil Clarke          | 124613MG            | 1653             |
| 24382  | 7590        | 01/12/2005           | EXAMINER            |                  |
| JOSEPH S. HEINO, ESQ.<br>DAVIS & KUELTHAU, S.C.<br>111 E. KILBOURN<br>SUITE 1400<br>MILWAUKEE, WI 53202-6613 |             |                      | MAI, ANH T          |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2832                |                  |
| DATE MAILED: 01/12/2005  |             |                      |                     |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/604,654 | <b>Applicant(s)</b><br>CLARKE ET AL. |  |
|                              | <b>Examiner</b><br>Anh T. Mai        | <b>Art Unit</b><br>2832              |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 November 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4,5,17-21,24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,17-21,24 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 4, 5, 17-21, 24-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Dean et al. [US 2002/0073717A1].

Dean discloses an RF coil 152 of hollow cylindrical positioned inside gradient coils 139, 140; apparatus for cooling the coil; a patient bore enclosure 32 inside RF coil which has cooling tubes 56, 58 attached to exterior of the enclosure; a pump 24 and heat exchanger 22; a computer system 200 electronically linked to coolant pump and temperature sensors [figures 1-8].

The cooling tube may either be in contact with wall 32 or may be embedded within the wall and the pattern of cooling tubes associated with wall 32 may take may different forms (i.e., linear along the length of wall 32, spirally around the wall 32, having tubes on the inside or the outside of wall 32, etc.). To this end, referring to FIGS. 6-8, a block representing a heat generating system component that may reside inside RF space 40 is illustrated and identified by numerals 20 (i.e., the table) 152 (i.e., the RF coil) and 32 (i.e., the wall). In FIG. 6 the table 56-58 is proximate the block, in FIG. 7 tube 56, 58 is in contact with the block and in FIG. 8 the tube 56-58 is partially embedded within the block.

As illustrated a series of hermetically sealed conduits or tubes collectively referred to by numeral 50 are interspersed within each of the gradient coils 139 and 140. Each tube is linked to pump 24 and heat rejecter 22 via inlet and outlet conduits 52, 54, respectively, to form a closed circuit from rejecter 22 through pump 24 to the coils and back again to the rejecter 22. In this manner cooling liquid can be provided to the field generating system components that reside outside the RF space 40.

As well known in the MRI industry, high power MRI systems consume large amounts of electrical power. In particular, the gradient and RF coils consume excessive amounts of power and thus these coils generate significant heat. As

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one would expect, excessive heat can cause system components to deteriorate or fail prematurely and hence adversely affects reliability. In addition, heat can be an annoyance to a patient during the imaging process and, if excessive, could injure a patient. For this reason there are regulations that stipulate the maximum temperature of a patient support table that effectively limit the amount of power that can be used in any MRI system.

Referring now to FIG. 4, while rejecter 22 and pump 24 may be linked separately to each component within the RF space 40, it is also contemplated that components to be cooled within space 40 could be linked in series. In addition, it is contemplated that components within RF space 40 and that reside outside space 40 that have to be cooled could be linked in series with a second portion of the conduit outside the RF space. For example, gradient coils 139 and 140 and RF coils 152 in FIG. 1 could be linked in series with pump 24 and heat rejecter 22. Moreover referring also to FIG. 1, any system components illustrated in FIG. 1 that need to dissipate heat could be linked in series or separately to rejecter 22 and pump 24. For example, RF electronics inside pulse generator module 121 could be linked to rejecter 22 and pump 24 for cooling purposes. Referring again to FIG. 4, an exemplary series linkage of system components is illustrated and includes table 20, RF coil 152, RF electronics (e.g., 121), a block 60 indicating any other components that need to dissipate heat and heat rejecter 22.

### ***Conclusion***

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO 892.

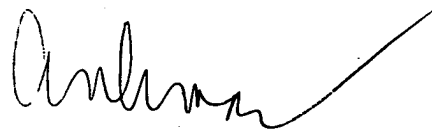
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh T. Mai whose telephone number is 571-272-1995. The examiner can normally be reached on 5/4/9 Schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin Enad can be reached on 571-272-1990. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

am

A handwritten signature in black ink, appearing to read 'Anh Mai', with a long, sweeping horizontal stroke extending to the right.

**ANH MAI**  
**PRIMARY EXAMINER**